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The modern equipment in training performance dancers

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Abstract

The motion convention determines in dancing, as in every sport, an integrative convergence of scientific interests in order to explain the phenomenon. It is known that every motion performance, in every sport, is based on motion guided by biomechanical laws. In dance, the body is the instrument, and as any other instrument, it has to be well studied and controlled. All these have led dance specialists to finding new ways of training. As a result, some devices and instruments were invented and adapted, which can contribute to the training for performance. Based on the solution offered the instruments, the professor can develop a system of specific exercises, for each type of deficiency, determined on the computer for a certain period of time.

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1. Introduction

The sports dancer's body, either in standard dancing or Latin dance, seems to float, glide effortlessly with an exquisite grace on the dance floor, as if permanently defying the laws of equilibrium, of forces and motion mechanisms. Nothing, however, deviates from some universal laws and rules, the virtuosity of execution being due to the very knowledge, respect and their use. It is important to analyze the dancer's motion from a general to a particular perspective, in order to understand how he moves, how he uses strength and gravity, the inertia, how the dancer can keep his balance in individual and couple turns.

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- From a general point of view, dance biomechanics encloses:
- Static studies – positions and equilibrium conditions of forces acting on the dancers' bodies;
- Dynamic studies – the cause of motion, internal forces;
- Kinematic studies- development process of dance moves;
- Biomechanical knowledge helps dancing to study and fathom technical motion.

2. Dance equilibrium

T During dancing, the body of the dancer is considered to be in balance when his evolution is determined by the state of balance. This can be static or dynamic.
In order to acquire this state the following conditions have to be fulfilled by the dancer:

- The center of the body mass has to fall on the support plan of the body;
- The sum of forces acting on the body has to be equal to zero.

In the case of a couple, because of the contact already existing between the partners, the state of balance is carried out through: Body mass;Forces;Inertia law;Summed up-force law;Reaction law;Strength ;Energy.

3. Dancing statics

The static activity of the muscles ensures the positions of the dancers' bodies as a whole or individually. According to the biomechanical conditions (of balance), *static activity* can be of three types: for maintenance, for consolidation or for fixation.

We understand under *Static Maintenance* activity that sort of isometric muscle contraction which ensures the position, acting against the force of gravity. (Example: the muscle maintaining the arms of the male and the female in a closed position, in standard dancing)

The *Static Consolidation* activity, mostly encountered at females, is carried simultaneously by the antagonistic muscles, in cases combined with the fixation activity in different static technical elements which also require support from the partner.

The *Static activity of fixation* (the most encountered in dance) ensures the body's equilibrium. It is carried out by the antagonistic muscles, which fight against forces tending to modify the static equilibrium.
In the *static of dancers' body* it is mainly distinguished the instable equilibrium, given by the inferior support and not coming back to the initial position of the body or its segments.

In the case of a couple, the closer the projection of the partners' center of the gravity is to the centre of the support surface of the couple, the more secure is the state of equilibrium.

4. Application

Dancing represents a sequence of rhythmic moves executed on a melody's tact. It is a manner of artistic expression of the human body. Dancing represents active rest, and at early ages it is necessary motion.

In dance, the body is the instrument, and as any other instrument, it has to be well studied and controlled.

Acquiring this technique can be made only through intense muscle training, an intense interior feeling and a high class preparation.

All these have led dance specialists to finding new ways of training. As a result, some devices and instruments were invented and adapted, which can contribute to the training for performance. The group of dance specialists from Brasov has tried this and will carry on with it. They have introduced some modern equipment in the process of training and evaluation. Although this equipment had initially another purpose, it was found that it can be adapted for dance as well. The results were seen fast.

5. Instruments to measure and test the dance performance

"MLD" disc for testing the muscular performance

MLD disc was built in 2010 by Harald Pernitsch, Prof. Doctor at the *Innsbruck University* in Austria. The purpose was to make efficient the specific force work. The equipment has an *external disc* and a computer soft, the entire program being developed by his innovator.

"*The jumps carpet Miron Georgescu*, Type MGM-15*"*

MLD disc is similar to "*The jumps carpet Miron Georgescu type MGM-15*", developed in 2004 by P. Hillerin and V. Valeanu, being intended for research and activities of evaluation, training, improvement and recovery of human performance.

The "Miron Georgescu jumps carpet" equipement is intended for the studies of human performance, in which series of repeated jumps are evaluated, the length of time in contact with the ground, as well as the length of time when the subject is off the ground. The device and the software implements directly the *Miron Georgescu method* modified at 15 jumps per series.

The software application, according to the above statements, is delivered with the device. The programs of further handlings, for advanced interpretations are prepared by the producer of the equipment.

The MLD disc uses during testing many ways to better suggest the *qualities specific to dance jumps*.

Jump motion is acyclic and is carried out going from a static position into a dynamic execution. For that reason, with the help of *MLD disc*, both the static position for swing, the dynamic execution of jumping , as well as combined forms can be separately tested. For example: the static-elastic-dynamic jump.

Tests show the dancer's evolution during the macro-cycles and the results analysis after every competition season. It is tested the equilibrium on the *Specific Static Position* as well as the equilibrium on the *Dynamic Jump*, both the jumping off and the landing.

In training the *specific equilibrium* for dance jumps can be trained and educated. The work can also be individual, in such a way that the dancer can visualize his own execution in real time and can correct himself without the professor. Therefore, the dancer can transfer the *general mass center* into various positions and can create a clear mental image of the right position. Thus, a connection is made between the professor's explanation regarding the international technical model and the sensory perception of the dancer. From the moment the initial position, biotechnical correct has been found, an entire execution of specific jumping off can be made. This jumping off can be carried out freely, without load but also with load, according to the weight of the dancer and the *test* that will be applied. The load is made with 20% more than the body weight for a static-elastic-dynamic execution.

The core program in dancing is the execution program which contains the development of a dynamic motion at the point of jumping off from a static swing position.

Therefore, due to the *MLD disc,* a nominal value can be distinguished, the one we wish to accomplish and the real value, the one accomplished. The particularities of the dancer, the difference between the two values are to be taken into account, thus giving solutions for a future program to train the dancer.

A clear analysis of the dancer's evaluation in time can be made, according to age particularities, following the relation of the physiological increase of the performance capacity at the moment, according to *the international model*

The research pattern, applied on the dancers from the Students Club is presented as follows (appendix).

The memory of *MLD program* registers all the dancers tested on the disc, the personal data and the moment when the test was made.

The program has the image of a *scale with space coordinates*: horizontal and vertical. The dancer will stand on the *external disc* connected to the computer. On the computer, there is the image of a small ball moving inside of a square, in real time, according to the center of gravity of the dancer on the *disc*. The dancer has to move slowly, back and forth, and at the side, from left to right, in such a way that the ball stabilizes exactly in the

centre of the ax conjunction. An important role is played here by the pressure on the foot, which can be directed to the top, to the heel or to the centre, where it is actually indicated.

There are different options to test various jumps (the base jump and the reactive jump) Among them it is also mentioned the test with *the load jump*, the jump with the weight on the shoulders (often seen in acrobatic dance with pairs, where the partners sustain each other) Every option can be tested one at a time.

The red light becomes green when the dancer's *centre of gravity* is stabilized on the centre, therefore the dancer can do the jump for testing. After the jump, the computer registers the data and *displays a graphic* with the result. More jumps are carried out and at the end the best one is registered by pressing "save".

The procedure is the same for the other jumps (elastic, without load, etc)

After the jump testing, the *isometric test* -"isotest" follows. This can be carried out individually by the dancer, trying to maintain the green ball on the center of the axes on the monitor. The given time is according to the time from the start point until the jump-off, according to the length of the trampoline, 6-10 seconds. It can be used as a tool of *training the specific isometric force.*

Another type of jumps is the ones connected, the series jumps. This kind of test is used for endurance. 12 jumps are made with an equal time for break according to the light on the monitor. The race from red to green represents the static position, vertically from top to the bottom.

It is observed the fact that, no matter the level of the dancer's fatigue, the jumps sequence is equal in time, the jump performance being registered. The effects of the fatigue are relevant to the height of the jump, to its dynamic and amplitude. Tests made at different periods can be compared with tests made at the present.

These tests cannot be taken under the age of 14.

After the tests, a program is developed, a work solution for the future with the purpose to improve the motion qualities of the tested dancer. Therefore, the computer presents in percent the recommendations of the system that has to be improved: body mass, maximal force, reactive force, explosive force, the load, the weight, speed, strength.

Based on the solution offered in percent, the professor can develop a *system of specific exercises*, for each type of deficiency, determined on the computer for a certain period of time. Control tests are made regularly for the specific training in order to verify the dancers' evolution.

Conclusion

- As a result of using these *Methods of Measure, Evaluation and Organization*, the *specific activity* of trainers can be more efficient, both on the regional and the national level.
- *Special individual programs for dancers and trainers* can be created, that can work according to national and international calendars of competition.
- The system can create a model which can be used by the next generations of trainers, that will know at that time the norms, standards of evolution of the dancers, starting with the beginners' level up to the great performance (in time, it can be compared with future models)
- By using these *programs and register cards,* both the activity of the dancers and the one of the trainers is accurately and objectively administered.

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